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Appropriation for the Lick Observatory.

The Legislature of the State of California has unanimously appropriated the sum of $50,000 to cover the expense of construction of a three-story concrete dormitory and two frame cottages, in replacement of residence space which was destroyed by the earthquake of July 1, 1911. Expenses on account of minor damages to substantially all the buildings on Mount Hamilton, to the clocks, domes, etc., in excess of the above appropriation, have been met from other funds. The new residence space will be ready for occupation in June of this year.

W. W. Campbell.

The Riefler Clock of the Lick Observatory.

The Riefler sidereal clock was first mounted at the observatory in November, 1906. It was finally sealed, after rating, in June, 1907. A description of the clock, and of its performance to the end of 1907, was given in these *Publications,* volume XX, page 29.

The original lower glass cylinder, forming one of the two enclosing bells, later developed serious cracks. The most pronounced were those radiating from the metal insert, where the wires enter the case, for the electric wind, and for the chronograph connection with the break circuit. Other small cracks surround the upper edge of the bell where it rested upon the iron supporting bracket. These cracks were probably the effect of expansion and contraction of the glass and metal under temperature variation. The range of temperature in the clock chamber, in the basement of the meridian-circle building, is about 30° in the course of the year.

Since these cracks allowed entrance to air, the special design of keeping the clock under constant air pressure was defeated, and a new lower case was accordingly ordered from Munich. The new glass bell was broken in the earthquake shock of July 1, 1911, when the pendulum was thrown off its supporting carriage, and fell down through the bottom of the case; fortunately without injuring the works of the clock in any way.

Another case, ordered from the makers at Munich and delivered in 1912, had been completely smashed in transit, possibly after the box had been opened and repacked at the custom house. The glass of the larger bell, however, was extremely thin, and appeared not to have been strong enough for so heavy a casting.

Finally, a lower bell of thin copper arrived last winter, with an upper bell of glass, this last made without the broad flange of the other upper bells. In place of having a ground-glass bearing surface of 1⅛ inches, the new bell has only the natural thickness of the glass, between one-eighth and one-fourth inch. With vaseline on the edges, the closing of the case appears to be as secure as in the former case, no leakage having occurred over the range of variation of atmospheric pressure from one to four inches. The new case was put in place and the clock mounted on February, 26, 1913. The clock was rated before finally closing, on April 9th, when the air was pumped out to the amount of 100 millimeters, or four inches difference atmospheric pressure. To test the change in rate thus produced, the air was later allowed to enter, up to half this difference, then back to normal pressure; and finally the pressure was reduced 30 millimeters, giving a safe margin below the outside barometric pressure, which has a range of less than an inch in extreme cases.

The following effects on the clock rate were produced by the changes of atmospheric pressure, from free entrance of air up to the lowest amount. The first column gives the record of the inside barometer, the scale reading of which requires a correction of — 18 millimeters for the upper end of the syphon tube.

RIEFLER SIDEREAL CLOCK.

Barometer, (Uncorrected), Metric.	Barometer, Standard, Inches.	Rate of Correction.	Change in Rate—	
			Per Mill.	Per Inch.
0.660	25.7	+ 0^{s}.34	.....	...
0.560	21.7	— 1 .52	0^{s}.0186	0^{s}.47
0.610	23.7	— 0 .63	0 .0178	0 .45
0.660	25.7	+ 0 .26	0 .0178	0 .45
0.630	24.5	— 0 .28	0 .0180	0 .46

This change of rate corresponds closely to that predicted by the makers of the clock. The rate responds promptly to the variation in atmospheric pressure, and the change of rate appears to be the same for differences at high and low pressure, over this limited range. It would be possible to control the clock at zero rate by varying the air pressure, if the temperature remained constant. The early record of the clock showed a change in rate of $0^{s}.016$ for a change of a degree Fahrenheit. This change should be investigated anew for constant pressure, and, meantime, the difference between inside and outside pressure must be kept great enough to insure the requisite pressure upon the upper bell for keeping the joint air tight.

In this connection it may be recorded that the Dent sidereal clock had formerly a temperature rate of $0^{s}.04$ for one degree Fahrenheit; and that the two Höhwn clocks have not shown any direct dependence upon temperature changes. All four clocks are now well rated, and the Frodsham and Howard clocks run on Pacific standard time, by control with the rates of others.

R. H. Tucker.

April 23, 1913.

Comet *a* 1913 (Schaumasse).

The first comet of the year was discovered by M. Schaumasse, at Nice, France, on the night of May 6, 1913. From observations by Antoniazzi at Padua, and Aitken at Mount Hamilton, on the night of May 7th, and by Hartwig at Bamberg on the night of May 8th, including an extreme interval of 0.9 days, we computed, by Leuschner's short method, a preliminary orbit, which was sent to Harvard College Observatory by telegram on May 9th. A second orbit was computed a few days later, based upon Aitken's measures on May 7th, 9th, and 11th, the elements differing but little from those obtained from the shorter arc.

The comet makes its closest approach to the Sun on May 16th and to the Earth on May 30th. It is now visible in a small telescope and will become somewhat brighter, but will not be a conspicuous object. It is moving northwest among the stars and will be well placed for telescopic observation for several months.

C. C. Kiess,
S. B. Nicholson.

May, 1913.